CHEMISTRY 129.01 Syllabus – Spring 2017 Workshop

Overview

Chemistry 129 is an introduction to college level chemistry. During the semester you should gain a deeper understanding of the basic chemical principles that are generally introduced in high school chemistry. To achieve this, problem solving in the different areas will be emphasized. Major areas to be covered include stoichiometric relationships, gas laws, atomic structure and molecular structures, chemical bonding, physical properties of solids, liquids, and solutions, energy changes in chemical reactions, thermodynamics, gas-phase equilibrium, and aqueous acid/base equilibrium. The laboratory is closely related to the class and you will learn how to conduct experiments that relate to the concepts you have learned. Good safety practices will be stressed.

Instructor Information

Name:	Prof. Corasi Ortiz
Lecture:	MWF 8:00 – 9:50 am (S-2510/2614)
Office Location:	S-2218
E-mail address:	ortizco@grinnell.edu
Office Phone Number:	641-269-3489
Office Hours:	M, W 1:30 – 2:30 pm T 10:00 – 11:00 am or by appointment

Mentor

Name: Khoi Luu
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Texts and Supplies

(i) ***Chemistry*,** OpenStax, (ISBN: 1938168399), Flowers, Theopold, Langley
https://openstax.org/details/books/chemistry

(ii) *Chemistry 129 Lab Manual* (provided in class) and laboratory glasses (provided in laboratory).

(iii) Laboratory notebook (bound) from the bookstore.

(iv) Greenhouse Gases Module (provided in class).

If you have not already skimmed through your text, do so now. Try to get a general idea of the order in which topics are presented, as well as a feeling for how you can preview, read, and review each chapter. Each chapter has numerous problems at the end; those not assigned for problem sets can be used to test your knowledge of the material in the chapter.

Class and Laboratory Attendance

Laboratory

Laboratory work is an integral and required part of Chemistry 129. The laboratory program is tied closely to the class work and, consequently, one class period will be devoted to an experiment each week. We will meet in S-2510 for a pre-laboratory discussion and then move to laboratory S-2614. You will be assigned a drawer with equipment. You also receive a key for the drawer that you will keep until the end of the semester. A safety orientation is also part of the first meeting. Eight experiments are included in the lab program; the lab schedule is given in the attached general schedule. You will receive the laboratory manual during your first class period. You must come to lab prepared by reading the experiment description and **having your lab notebook prepared**, so that you will know how you will carry out the experiment and what sort of information you will need to record. It is a good idea to read through the questions at the end of the lab report form as well.

Your clothing should be comfortable older clothes that you can tolerate losing. Your clothes should more or less cover all of you and not have loose floppy sleeves or other appendages that can get in the way, catch fire easily, or catch on apparatus. Your feet must be protected by closed-toe/closed-heel shoes and socks. Sandals and bare feet are not allowed for any reason. Sleeveless shirts and shorts (or short skirts with or without leggings) will not be allowed in the lab. The use of contact lenses in lab is not recommended but these can be worn if you wear safety goggles. If you come inappropriately dressed for lab, you will be asked to leave (even if you are not wearing socks).

There are few valid reasons for missing a lab. If you must miss a lab due to illness or participation in an approved college activity, consult your lab instructor **before** the laboratory about special arrangements required for you to make up the lab. Written documentation from a health professional may be required in order to make up work missed due to illness. For reasons of safety and interference with other classes using the same facilities, you are not free to use the lab space any time you please. **Missing 3 or more lab meetings will result in a failing grade in the course.**

Class

The attached schedule describes the order of topics and gives general reading assignments for the course. More detailed outlines and problem assignments will be provided in class each week. Punctuality is an important life skill. Students who are successful arrive to class on time and are rarely, if ever, absent. **Attendance of the class meetings is compulsory** because you will be working in groups on several projects. **Poor attendance (including tardiness) will lead to a lower grade or F in the course**. Written documentation from a health professional may be required in order to make up work missed due to illness.

Assignments and Class Preparation

Because chemistry is a quantitative science, problem assignments are an integral part of the course, and a substantial fraction of your study time should be devoted to working the assigned problems. Problem sets will be assigned weekly and, in some instances, pre-class exercises will be assigned prior to a class meeting. Problem sets will be collected and graded; in some cases, only selected, representative problems will be selected for grading. Problems will be graded not just for the final correct answer, but also for the method and completeness of the solution. Working with others on homework assignments is often helpful and is encouraged. You may want to organize a small study group (3-4) among your dorm mates or classmates. If you work on problems with other students, please acknowledge them in the assignment. However, you must remember that the majority of your grade will be determined by your ability to solve problems on your own during exams.

One key to learning chemistry is repetition. You will find that the more times you learn/talk about/use a concept, the better you understand the concept. For this reason, to get the most out of each class it is important that you already be somewhat familiar with the material prior to class. The minimum that I expect you to do prior to each class is read the assigned reading for that day. After a first quick scan, it often helps to read through the section much more carefully. In addition to the assigned reading, you'll be assigned a few questions about the reading (which will be collected during class) along with notes you take as you read about what you think are the most important concepts being covered. Overall, the estimated time for a careful class preparation should be 40 minutes to 1 hour). If you follow this approach, you will come to class much better prepared.

Assignments must be handed in on time. Please **staple** the pages of each problem set together and use standard size, 8 1/2 by 11 paper. A stapler is provided in the lecture hall. If you cannot staple them, use a paper clip. Please **do not** bend over the edges of one corner, fold the paper in half, or hand them in loose; such homework assignments run a much higher risk of getting lost, misplaced, or separated. Please, write the answers to all the problems in a neat manner so they can be easy to read and grade. The problem sets will be collected at the beginning of the lecture period. **Late homework will not be accepted.** If you have a planned excusable absence (ie. religious holiday, athletic contest or similar event), you must turn in your homework prior to class.

Quizzes and Examinations

Starting on February 3rd, weekly quizzes will be given **every Friday**. These will cover the learning goals of the previous week. **No make-ups will be given.** If you have a planned excusable absence, so long as you provide one week notice, you will be able to make up the quiz in advance of your absence.
On **Friday, March 17th**, a midterm exam will be given. It will cover the learning goals of weeks 1 thru 7. Unless something unusual happens, the midterm exam will be given within one or at most two lecture periods of the projected date. Also a comprehensive final exam will be given on **Wednesday, May 17th**. **No provisions for make-up of examinations** will be made, except under extraordinary circumstances.

Each exam or quiz will cover a specified group of chapters. All material in those chapters, unless specifically excluded by your instructor, should be studied and understood prior to the exam or quiz, even material not discussed completely in the lecture. Exams and quizzes will consist of problems (including one or two questions that closely resemble homework problems), definitions, and discussions of concepts. Exam format depends on the instructor's preference, but an effort will be made to have one or two problems on each exam that require an ingenious application of the chemical principles discussed in lecture.

General Comments on Problem Sets, Exams, and Quizzes

First, always show your reasoning. Simply stating the answers is not sufficient. For discussion-type problems, tell why your answer is correct. For quantitative problems, show your math in **reasonable detail**. A correct answer that does not show the logic leading to it **will not receive any credit**. These principles apply to examinations, quizzes, and problem sets. Shortly after each problem set is due or a test is graded, an answer key will be posted on PWeb. Please consult it frequently. Exams and quizzes must reflect your own work, but for problem sets, feel free to consult anyone willing to give you assistance, including instructors, mentors, upper-class students, tutors or classmates. However, copying the solutions from an answer key for the homework assignments is plagiarism and therefore not acceptable.

Grades

The final grade in the course will be computed on the following basis:

Laboratory…….. 25%
Homework…… 10%
Quizzes…… 25%
Class Prep and Participation…… 6%
Midterm Exam…….…… 14%
Final Exam…….. 20%

Grading Scale

100	**–**	**90%**	**A/A-**
89.9	**–**	**77%**	**B+/B/B-**
76.9	**–**	**67%**	**C+/C**
66.9	**–**	**55%**	**D**
54.9	**–**	**0%**	**F**

Calculators

Hand-held calculators (not cellphones) are permitted during exams and quizzes. It is a good idea to bring your calculators to all classes, not just those for which quizzes or exams are scheduled. You should make sure that yours is fully charged and operational before coming to class, or you may find yourself doing a lot of math longhand. Your calculator should have the four basic functions (+, –, ×, ÷, plus π, log, ln (natural log), 10^x (inverse log), e^x (inverse ln), 1/x, y^x, and $\sqrt{\ }$ keys. One or two memory storage keys are also helpful. Make sure that your calculator is capable of handling scientific notation.
A good calculator is a very useful tool for quantitative problem solving. However, a calculator will not solve problems for you. When working quantitative problems, you should first set up the problem using symbols and units, insert corresponding numerical values in the expressions, and then (and only then) reach for the calculator.

Help!

Your Instructor. Your instructor in the course has primary responsibility for all aspects of the class. The principal instructional methods in this course include class meetings, laboratory sessions, and individual reading and study of the text and other course materials. These activities should occupy the majority of the time you devote to this course. If you need additional help, seek out your instructor for assistance and for specific suggestions on the best strategies for optimizing your studying. If possible, arrange to talk to your instructor during posted office hours. If that is not possible, set up an appointment after class—or via e-mail or telephone.

Mentors. Each lecture section also has an assigned upper-class mentor, who will attend all classes and will meet at least once a week at a designated time (or times) with students who desire an additional focused study session. The mentor groups will discuss the material covered in class and homework assignments. Participation in the mentor group is recommended but not required. The best way to improve student performance in the course is to attend the mentor groups.

Tutors. Individual tutors are available. See Minna Mahlab in the Science Learning Center.

FINAL EXAM SCHEDULE

Section	Instructor	E-Mail	Place	Time	Exam Date
1	Ortiz	ortizco	S2022	2:00 pm	Wed., May 17

TOPICS

Week	Starting	Topic	Text: Chapters
1	January 23	Stoichiometry and Solutions	3, 4
2	January 30	Greenhouse Gases Structure of the Atom and Nomenclature	2, Module
3	February 6	Greenhouse Gases Electronic Structure	6, Module
4	February 13	Greenhouse Gases Periodic Properties	7, Module
5	February 20	Greenhouse Gases Bonding	8, Module
6	February 27	Greenhouse Gases Molecular Geometry	9, Module
7	March 6	Intermolecular Interactions	11
8	March 13	Chemical Equilibrium	15
		Spring Semester Recess: March 18 – April 2	
9	April 3	Acid/Base Equilibria	16
10	April 10	Buffers and Titrations	17
11	April 17	Buffers and Titrations	17
12	April 24	Thermochemistry	5
13	May 1	Chemical Thermodynamics	19
14	May 8	Integration	

Final Exam: Wednesday, May 17 at 2 pm

LABORATORY SCHEDULE

Week	Starting	Experiment		
		#	Points	Title
1	January 23			Introduction, Safety Discussion/Video
2	January 30	1	15	Reaction of Silver Ion with Copper
3	February 6	2	20	Synthesis of Sodium Hydrogen Carbonate
4	February 13	3a	20	Qualitative Analysis Utilizing Periodic Properties: Analysis of Knowns
5	February 20	3b	20	Qualitative Analysis Utilizing Periodic Properties: Identification of Unknowns
6	February 27	4a	15	Which Gases Are Greenhouse Gases?
7	March 6	4b	15	IR Spectroscopy of Greenhouse Gases
8	March 13	5	15	Intermolecular Interactions
	Spring Break		10	**Notebook Due March 17**
9	April 3	6a	15	Quantitative Analysis: Preparation of HCl Solution; Titrations
10	April 10	6b	15	Quantitative Analysis: Standardization of HCl Solution
11	April 17	6c	20	Quantitative Analysis: Analysis of a Soda Ash Unknown
12	April 24	7	45	Analysis of Sodium Hydrogen Carbonate
13	May 1			
14	May 8	8	15	Goldschmidt Reaction, Checkout
			10	**Notebook Due May 12**